

**The very sound mixers
from Yamaha.**



**Put reliability between the music
and your audience.**

You have your sound.

We have our complete line of professional sound mixers.

As a professional, you already know the importance of creative control in bringing together the right musical balance for the right effect—whether your output is for a live audience, or for recording.

We understand that importance, too.

We understand it because we took the trouble to ask questions before we ever built mixer one.

You told us that you wanted flexibility, so that you could innovate as much as possible. We give you more inputs and outputs than you might expect to find. And we provide a wide range of controls. Plus a variety of ways to put it all together.

You also told us that being on the road is rough. So you'll find that Yamaha sound mixers are built to be reliable and tough enough to take travel and still perform flawlessly. At a moment's notice. Performance after performance.

And if you want your Yamaha mixer to stand still in a sound studio—fine. The reliability can be taken for granted.

Electronics excellence? We insist on it. Especially when it comes to distortion. We design systems where low-distortion is the law. You'll never find the mixer getting in the way of what your sound is intended to be.


We just bring you control. Reliable, beautiful, creative control.

Seven systems worth.



With Yamaha, everything is in control.





The image shows a Yamaha mixer, likely a portable model, housed in a dark wood-grain carrying case. The mixer is positioned horizontally, showing its top surface with numerous sliders, knobs, and four VU meters. A blue license plate with the text '489 GBA' is attached to the left side of the mixer. The background is dark and out of focus, with some red and blue lights visible.

Rugged mixers built to travel.

When the show gets on the road, it has to be right in every respect.

And that includes the equipment. Simple failure is simply not acceptable.

That's why road-trip durability is a primary design goal when Yamaha designs and builds mixers.

Each mixer is fully portable. Each is constructed to be easily serviced. Cabinets are made strong to shrug off the bumps and jolts that come with touring.

Thousands of miles and hundreds of successful concerts testify to the quality and reliability you expect from Yamaha.



YAMAHA

International Corp. Box 6600, Buena Park, Calif. 90620

CRM-34

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THE YAMAHA
EM-80 Stereo Mixer

4 input channels,
60W RMS power output (30W x2)

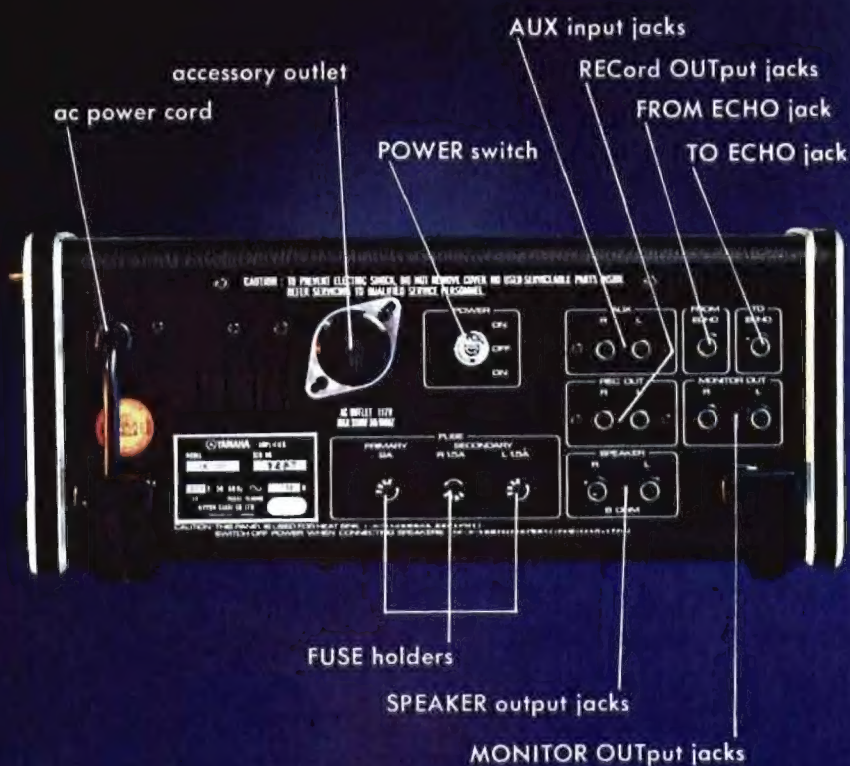
If you want to make the most out of four channels of input, for the least amount of money, this stereo output mixer is the one.

Think of what you can do with features like high and low equalization on every input; separate master level controls for program, monitor, and echo outputs; several mono and stereo auxiliary inputs; and a unique input selector which allows each channel to accept high or low impedance microphones, electric instruments, or high level line sources like tape recorders.

Each input channel has volume, bass, treble, reverb/echo, stereo pan, and input selector controls.

SPECIAL FEATURES:

- Stereo pan controls on each input channel.
- Echo/Reverb bus can be used through *To-Echo* jack to drive monaural monitor amplifiers, or tape recorder.
- Monitor and speaker outputs have separate volume controls, so that you can set levels independently.
- Mixers can be linked by connecting *Record-Out* of one to *Aux* or *Record-Out* of others. The flexibility is unlimited.
- Stereo headphone jack for driving headsets or monitor amp.





EM-80 SPECIFICATIONS

Number of Inputs	4-input channels (each switchable for MIC, INST or LINE). 2-auxiliary stereo inputs (AUX and REC OUT). 1-auxiliary monaural input (FROM ECHO).	Power Output	60-Watts RMS (2 × 30W) amplifier. For 8-ohm speakers.
Input Channel Controls	VOLUME, BASS & TREBLE (± 15dB of high and low frequency equalization), REVERB/ECHO, BALANCE (stereo pan), INPUT SELECTOR (MIC, INST, LINE).	Amplifier Type	All solid state, discrete and integrated circuit (IC).
Mixing Buses	2-Program (stereo Left and Right), 1-Echo/reverb.	Power Requirements	110-120VAC, 50/60Hz, 130W. Grounded (3-wire) outlet.
Number of Outputs	2-SPEAKER, 2-MONITOR, 2-RECORD OUT, 1-PHONES, 1-TO ECHO.	Protection Circuitry	Primary fuse, 2A; Secondary fuses, 1.5A (× 2), Type FKD.
Master Controls	MASTER VOLUME, MONITOR VOLUME, MASTER ECHO/REVERB, AUX VOLUME.	Physical Dimensions	Width 13 ¹ / ₂ " (34.5cm) × Height 5 ¹ / ₄ " (14.4cm) × Depth 14 ³ / ₄ " (37.6cm). Weight 17.6 lbs. (8.0kg).
Echo and Reverb	Built-in Accutronics spring-type reverberation unit; provisions for connection of external reverb, echo delay, or other effects devices.	Finish	Integral carrying strap, rubber feet on bottom and side, 2-way power switch to minimize hum, power ON pilot lamp, 250-Watt accessory AC outlet, color-coded control knobs.
		Warranty	One (1) year, parts and labor.

See page 21 for Frequency Response Curves. Page 22 for Block Diagram.

THE YAMAHA EM-100 Stereo Mixer

6 input channels,
60W RMS power output (30Wx2)

If you need six input channels for starters, plus some interesting extras, step up to one of the most versatile values in the line.

In addition to the built-in Accutronics reverb unit, you'll find such features as illuminated VU output meters; high & low equalization on every input; separate master level controls for program, monitor, and echo outputs; several mono and stereo auxiliary inputs; and a unique input selector which allows each channel to accept high or low impedance microphones, electric instruments, or high level line sources like tape recorders.

Each input channel has volume, bass, treble, reverb/echo, stereo pan, and input selector controls. But you would expect no less.

SPECIAL FEATURES:

- Stereo pan controls on each input channel.
- Echo/Reverb bus can be used through To-Echo jack to drive monaural monitor amplifiers, or tape recorder.
- Monitor and speaker outputs have separate volume controls, so that you can set levels independently.
- Mixers can be linked by connecting Record-Out of one to Aux or Record-Out of others. The flexibility is unlimited.
- Stereo headphone jack for driving headsets or monitor amp.





EM-100 SPECIFICATIONS

Number of Inputs	6-input channels (each switchable for MIC, INST or LINE). 2-auxiliary stereo input (AUX and REC OUT). 1-auxiliary monaural input (FROM ECHO).	Power Output	60-Watts RMS (2 x 30W) amplifier. For 8-ohm speakers.
Input Channel Controls	VOLUME, BASS & TREBLE (± 15 dB of low and high frequency equalization), REVERB/ECHO, BALANCE (stereo pan), MIC/INST/LINE (input selector).	Level Indicators	2-illuminated VU meters.
Mixing Buses	2-Program (stereo Left and Right), 1-Echo/Reverb.	Amplifier Type	All solid state, discrete and integrated circuit (IC).
Number of Outputs	2-SPEAKER, 2-MONITOR, 2-RECORD OUT, 1-PHONES, 1-TO ECHO.	Power Requirements	110-120VAC, 50/60Hz, 130W. Grounded (3-wire) outlet.
Master Controls	MASTER VOLUME, MONITOR VOLUME, MASTER ECHO/REVERB, AUX VOLUME.	Protection Circuitry	Primary fuse, 2A; Secondary fuses 1.5A (x2); Type FKO.
Echo and Reverb	Built-in Accutronics spring-type reverberation unit; provisions for connection of external reverb, echo delay, or other effects devices.	Physical Dimensions	Width 17" (42.9cm) x Height 5 1/4" (14.4cm) x Depth 14 1/4" (37.6cm), Weight 18.7 lbs. (8.5kg).
		Finish	Black, with protective aluminum trim.
		Additional Features	Integral carrying strap, rubber feet on bottom and side, 2-way power switch to minimize hum, power ON indicators in VU meters, 250 Watt accessory AC outlet, color-coded control knobs.
		Warranty	One (1) year, parts and labor.

See page 21 for Frequency Response Curves, Page 22 for Block Diagram.

THE YAMAHA EM-150 Stereo Mixer

6 input channels,
150W RMS power output (75W x2)

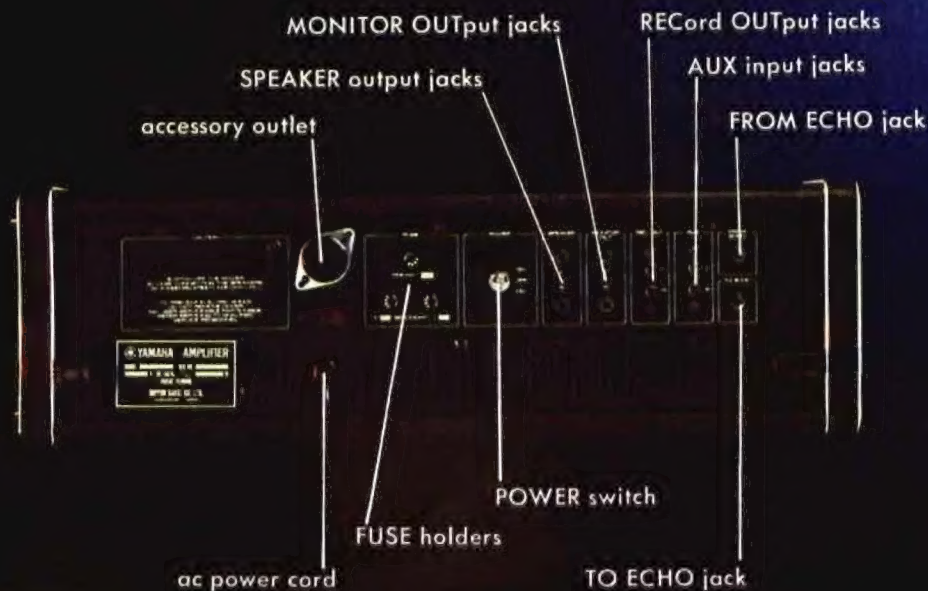
The 7-frequency Graphic Equalizer feature in this powerful mixer not only gives you a unique tool for eliminating feedback, it also lets you develop infinite tonal qualities in the speaker output. The linear controls outline any frequency response curve as it is created. It shows you how you're doing at every moment.

What's more, the EM-150 includes a built-in Accutronics reverb unit and illuminated VU output meters. Plus features such as high and low equalization on every input; separate master level controls for program, monitor, and echo outputs; several mono and stereo auxiliary inputs; and a unique input selector which allows each channel to accept high or low impedance microphones, electric instruments, or high level line sources like tape recorders.

Each input channel has volume, bass, treble, reverb/echo, balance (stereo pan), and input selector controls.

SPECIAL FEATURES:

- 150W RMS at less than 1% distortion.
- Equalizer on-off switches permit by-passing equalizer on left, right, or both channels as you choose. It's your concert, it should be your decision.
- Echo/Reverb bus can be used through To-Echo jack to drive monaural monitor amplifiers, or tape recorders.
- Monitor and speaker outputs have separate volume controls, so that you can set levels independently.
- Mixers can be linked by connecting Record-Out of one to Aux or Record-Out of others. The flexibility is unlimited.
- Stereo headphones jack for driving headsets or monitor amp.





EM-150 SPECIFICATIONS

Number of Inputs	6-input channels (each switchable for MIC, INST or LINE). 2-auxiliary stereo input (AUX and REC OUT). 1-auxiliary monaural unit (FROM ECHO).	Graphic Equalizer	7-Band, for SPEAKER and PHONES outputs; 12dB of boost or cut at: 60, 150, 400Hz, 1, 2.5, 5 & 10kHz.
Input Channel Controls	VOLUME, BASS & TREBLE (± 15 dB of low and high frequency equalization), REVERB/ECHO, BALANCE (stereo pan), MIC/INST/LINE (Input Selector).	Level Indicators	2 illuminated VU meters.
Mixing Buses	2-Program (stereo Left and Right), 1-Echo/Reverb.	Amplifier Type	All solid state, discrete and integrated circuit (IC).
Number of Outputs	2-SPEAKER, 2-MONITOR, 2-RECORD OUT, 1-PHONES, 1-TO ECHO.	Power Requirements	110-120VAC, 50/60Hz, 280W. Grounded (3-wire) outlet.
Master Controls	MASTER VOLUME, MONITOR VOLUME, MASTER ECHO/REVERB, AUX VOLUME, GRAPHIC EQUALIZER ON/OFF (Left & Right).	Protection Circuitry	Primary fuse 5A; Secondary fuses 3A (x2); Type FKD.
Echo and Reverb	Built-in Accutronics spring-type reverberation unit; provisions for connection of external reverb, echo delay, or other effects devices.	Physical Dimensions	Width 22 $\frac{1}{2}$ " (56.8cm) \times Height 7" (17.7cm) \times Depth 15 $\frac{1}{4}$ " (38.9cm). Weight 37.4 lbs. (17kg).
Power Output	150 Watts RMS (2 \times 75W) amplifiers. For 8-ohm speakers.	Finish	Black, with protective aluminum trim.
		Additional Features	Integral carrying strap, rubber feet, 2-way power switch to minimize hum, power ON indicators in VU meters, 250-Watt accessory AC outlet, color-coded control knobs.
		Warranty	One (1) year, parts and labor.

See page 21 for Frequency Response Curves. Page 22 for Block Diagram.

THE YAMAHA PM-200B

Professional Sound Reinforcement Mixer 8-input-channel monaural

Check the features of this mixer. Then see how many ways you could use it.

More than enough headroom to handle the most severe peaks and transients common to today's music.

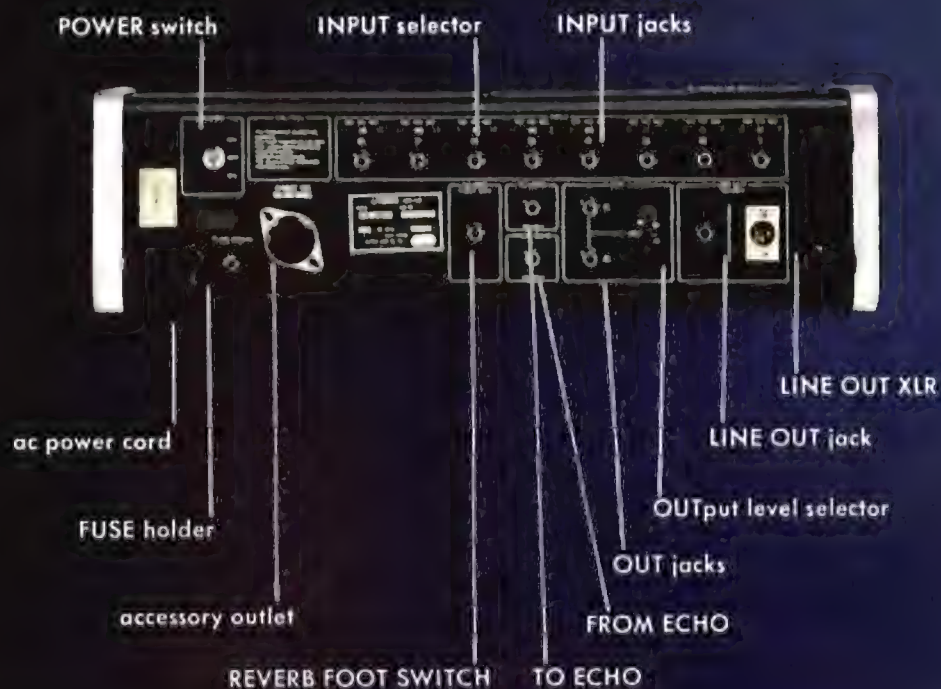
Input Selector adjusts input level and impedance. For use with high or low impedance microphones or high level line sources such as tape recorders.

You'll find a 5-stage Acoustic Control filter for reducing feedback; switchable input and output levels; a built-in Accutronics reverb; a large VU meter for accurate monitoring. And a lot more.

The controls for each channel are Input Selector, Volume, Bass, Treble, Reverb/Echo Volume, and Reverb/Echo Selector.

SPECIAL FEATURES:

- Built-in effects, such as reverb.
- Linear fader volume control for each channel. Perfect for ultimate level balance.
- Output level selector can adjust output if necessary for best signal-to-noise ratio and master fader range travel. It's a nice option to have in unfamiliar surroundings.
- Reverb-Echo bus can be used as separate monitor bus or as a system to drive effects such as tape recorders, or used with the built-in Accutronics Reverb, or both, depending on selector.
- Wide range of equalization, $\pm 15\text{dB}$.
- VU meter range can be set at Normal or Low, to offer a wider range.
- Transformer isolated floating line output which is used for driving tape recorders, for example.
- Headphone jack (mono) with level control, also can drive monitor speakers.





PM-200B SPECIFICATIONS

Number of Inputs	8-Input channels, mono auxiliary input (FROM ECHO).	Frequency Response	+0, -4dBm, 20Hz to 20kHz.
Input Channel Controls	VOLUME, BASS, TREBLE, REVERB/ECHO VOLUME, REVERB/ECHO SELECTOR, INPUT SELECTOR.	Hum and Noise	-125dBV equivalent input; -73dBm at output (all faders down); -55dBm at output (all faders up).
Mixing Buses	1-Program, 1-Echo, 1-Reverb.	Distortion (THD)	Less than 1% at +4dBm output (1kHz).
Number of Outputs	5-mono.	Program Filter	ACOUSTIC CONTROL; 0, 6 or 12dB of attenuation at any combination of 5-frequencies, 150, 400, 900Hz, 2 and 5kHz.
Master Controls	MASTER VOLUME fader, MASTER ECHO/REVERB fader, PHONES VOLUME.	Amplifier Type	All solid state, discrete and integrated circuit (IC).
Echo and Reverb	Built-in Accutronics spring-type reverberation unit; provisions for connection of external reverb, echo delay, and other effects devices.	Power Requirements	110-120VAC, 50/60Hz, 10W; grounded (3-wire) outlet.
Level Indicators	Illuminated VU meter, switchable; NORMAL range, 0 VU indicates +4dBm or -6dBm with OUTPUT LEVEL SELECTOR at +4 and -6 respectively; LOW range, 0 VU indicates -9dBm or -19dBm with OUTPUT LEVEL SELECTOR at +4 and -6 respectively.	Physical Dimensions	Width 20" (50.9cm) x Height 6" (15.4cm) x Depth 16 1/2" (42.2cm), Weight 23.2 lbs. (10.5kg).
Headroom	11dB (Nominal output +4dBm, clipping level +15dBm).	Finish	Black, with protective aluminum trim, rubber feet.
Input Characteristics	-50dBm (2.4mV) impedance 2.5K Ω , -40dBm (7.8mV) 8K Ω , -20dBm (78mV) 50K Ω .	Additional Features	Integral carrying strap, leatherette case, fused protection, power ON indicator, AC accessory socket, remote echo/reverb foot switch jack.
		Warranty	One (1) year, parts and labor.

See page 21 for Frequency Response Curves. Page 23 for Block Diagram.

THE YAMAHA PM-400B*
Professional Stereo Sound Reinforcement Mixer
8-input-channel stereo

The PM-400B is a professional in every sense. Its design is the most versatile possible.

It can be used in a variety of applications. As a program mixer, program sub-mixer, or on-stage monitor mixer, and can be stacked in either an 8x2, 16x2, or 24x2, etc. configuration by using the line output of one mixer into the sub input of another.

It's perfect for disco, recording (2 or 4 track) and broadcast. With truly professional features.

The PM-400B has transformer isolated floating low impedance XLR inputs. Most of its outputs are transformer isolated floating professional XLR connectors. The benefit: super low noise, and longer cable runs without severe high-frequency attenuation.

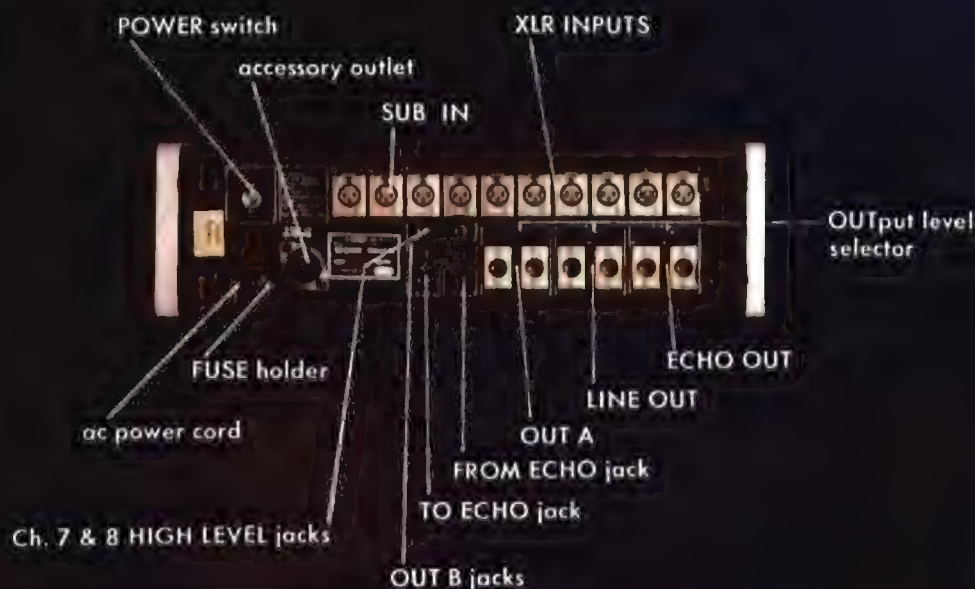
The Echo bus is completely versatile. Echo can be placed at either Master output channel, or both. This allows two completely independent monitor mixes. Use it also for external stereo effects.

It also has an unbalanced, high impedance high or low line level input on channel 7 or 8, in addition to the normal XLR connectors. (Use it for echo return or other effect devices.)

SPECIAL FEATURES:

- 2 program masters and 2 echo masters.
- High pass (low cut) filters to eliminate air conditioning noise, rumbles and subsonic frequencies.
- $\pm 15\text{dB}$ of equalization on each channel.
- Very low noise ratio (-125dBv). Also very compact.
- Stereo headphone output with separate level controls.
- VU meters allow visual indication of program output, line output, or echo output.

*Also available in an unbalanced, phone-plug model known as the PM-300.





PM-400B SPECIFICATIONS

Number of Inputs	8-input channels, plus stereo and mono auxiliary inputs.	Hum and Noise	125dBV equivalent input. 68dBm at output (MASTER and channel faders down). 50dBm at output (MASTER and channel faders up).
Input Channel Controls	VOLUME, BASS, TREBLE, ECHO, INPUT SELECTOR, OUTPUT SELECTOR, ECHO OUTPUT SELECTOR.	Power Output	+18dBm program level at clipping (600-ohm load).
Mixing Buses	2-Program (stereo L and R); 2-Echo (1 and 2).	Distortion (THD)	1% or less at +4dBm, 30Hz-20kHz; 0.25% or less at +18dBm, 1kHz.
Number of Outputs	5-stereo; 1-mono.	Output Headroom	14dBm above nominal level (+4dBm).
Master Controls	2-MASTER faders (L, R); 2-ECHO MASTER faders (1, 2).	Program Filter	2-LOW CUT, 6dB attenuation point switchable to 80Hz or 160Hz on each filter.
Level Indicators	2-VU meters, each switchable for MASTER, LINE or ECHO, 0 VU = +4dBm (with LEVEL SELECTORS at +4dBm).	Amplifier Type	All solid state, discrete and integrated circuit (IC).
Input Sensitivity	0.8mV at max. gain for +4dBm program output.	Power Requirements	110-120VAC, 50/60Hz, 7W ₂ grounded (3-wire) outlet.
Input Clipping Level (1 kHz, Ch. FADER at 3)	MIC: 100mV (Input Selector at -50). 250mV (Input Selector at -40). 3.0V (Input Selector at -20). SUB: 6.5V (MASTER fader at 2.5).	Physical Dimensions	Width 20" (50.9cm) - Height 6" (15.4cm) Depth 16 1/2" (42.2cm). Weight 28.7 lbs. (13kg).
Voltage Gain Ratios	Program: 63° 2dB MIC input to OUT A. 53° 2dB MIC input to OUT B. Monitor: 52° 2dB MIC input to PHONES. 58° 2dB MIC input to LINE OUT. Echo: 63° 2dB MIC input to ECHO OUT. 45° 2dB MIC input to TO ECHO. Aux. Inp. 26° 2dB SUB IN to OUT A. 34° 2dB FROM ECHO to OUT A.	Finish	Black, with protective aluminum trim, rubber feet.
Frequency Response	0 - 4dB from 20Hz to 20kHz; 0.5dB from 50Hz to 10kHz.	Additional Features	Integral carrying strap, leatherette case, fused protection, power ON indicators, AC accessory socket.
		Warranty	One (1) year, parts and labor.

See page 21 for Frequency Response Curves. Page 23 for Block Diagram.

THE YAMAHA PM-1000

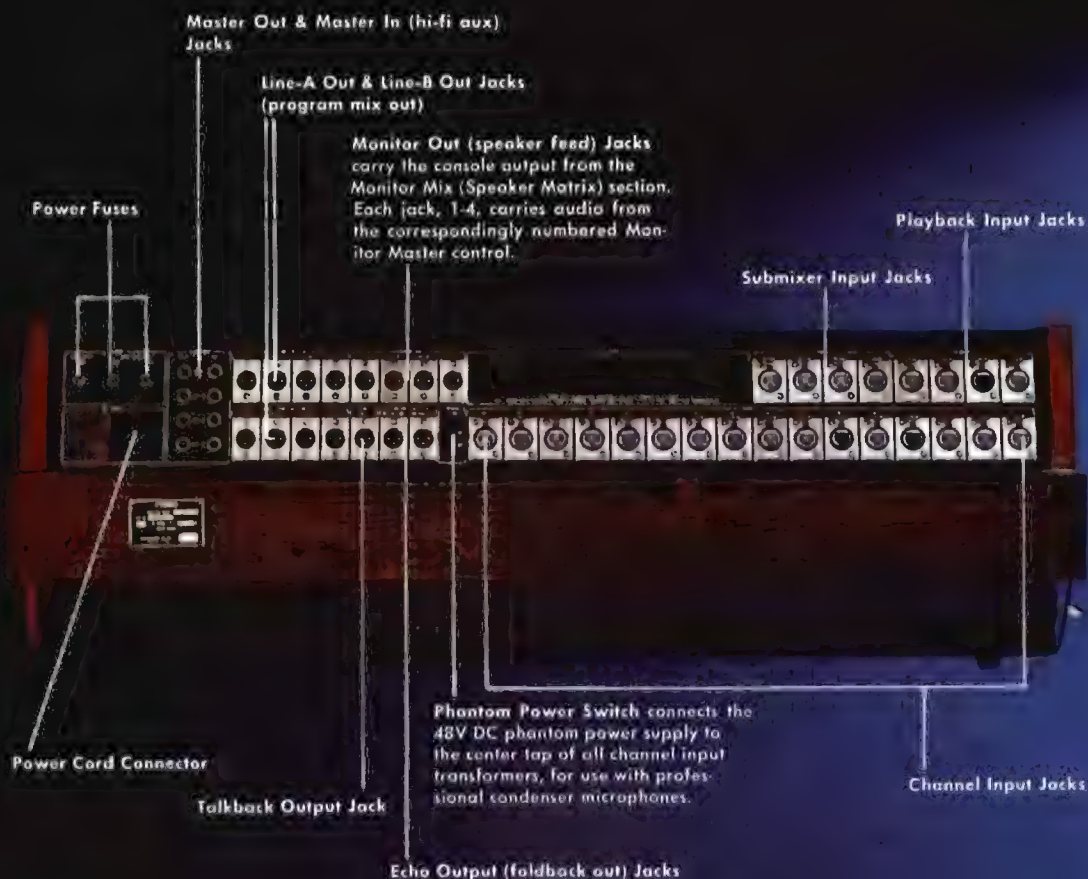
Professional Sound Reinforcement Mixing Console
16 input channels, four output channels

When professional sound men, and performers get together with a designer-and-manufacturer that has the capability and desire to achieve the highest standards of electronics performance, versatility, flexibility, and reliability — the outcome is bound to be a winner.

The PM-1000 reflects this field input by meeting the most exacting and varied demands of the professional — whether he is working in a concert hall or a sound studio.

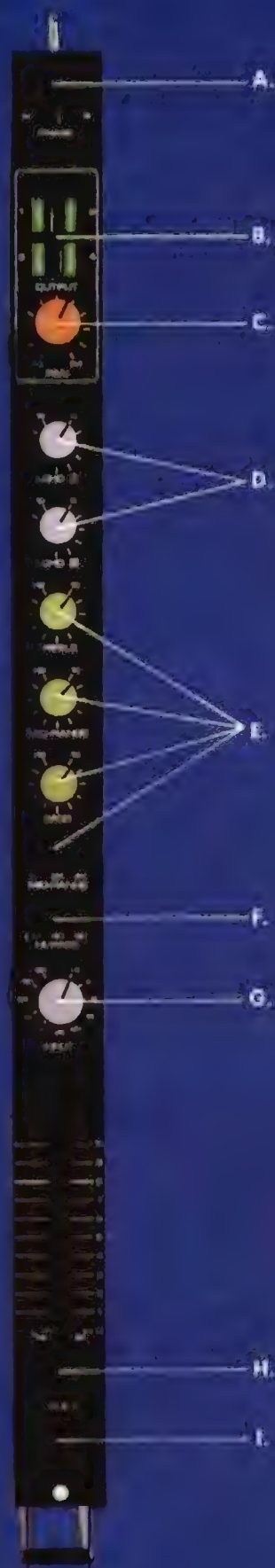
Modular construction; all solid-state circuitry; rosewood cabinet; portability; and relative economy are just a few of the reasons the PM-1000 leads its class.

It's for the band or recording studio on the way to the top. Or already there.





See page 23 for Block Diagram.



THE INPUT MODULE

A. Phase Switch Reverses the polarity of the audio signal entering the input module. This switch eliminates the need to rewire connectors for out-of-phase audio sources. Sliding the switch from **N** (normal) to **R** (reverse) interchanges the leads joining pins **2** and **3** of the **XLR** connector to the input transformer's primary winding.

NOTE: PM-1000 XLR connectors are wired according to DIN Standards; pin 2 high and pin 3 low. Refer to the Installation Section for details. *Normal* phase for this console means that a positive voltage applied to pin 2 at the input causes a positive voltage to appear at pin 2 of the XLR outputs.

B. Output Assign (Bus Assign) Switches Apply audio from the input module to any combination of the four program mixing buses. Latching switches 1, 2, 3 and 4 either individually or in any combination assign post-equalizer and fader audio to correspondingly numbered buses. As described below, adjusting the **Pan** pot to either side of center alters the level applied to the four program mixing buses.

C. Pan Pot Adjusts the relative output level available to the four program mixing buses. Panning to the center position provides equal output at full post-fader level to all four **Output** assign switches. In other words, the program is *centered* in four buses. Panning to the left gradually removes audio from the feed to buses 2 and 4, maintaining full output to buses 1 and 3. Conversely, panning to the right gradually removes the output from buses 1 and 3, maintaining full output in buses 2 and 4. The *left* and *right* designations are arbitrary, based on the rotation of the pan pot; they refer to the use of the console's line outputs for driving stereo or 4-channel recorders and/or loudspeaker systems.

D. Echo 1 and Echo 2 (Echo Mix Controls) Adjust the module's output to each of two auxiliary mixing buses. These controls apply pre-fader, post-equalizer audio to the correspondingly numbered echo mixing buses. The audio on these buses can be fed to external reverbs, echo devices or tape delay units. In addition, the echo outputs are ideally suited to driving performer's cue headphone systems or stage monitor (foldback) systems; these applications require external power amplifiers.

E. Equalizer Alters the frequency response of the input module in order to create a tremendous variety of tonal characteristics. The **Mid-Range** control acts on any of three presence frequencies (1kHz, 2kHz or 4kHz), as determined by the **Mid-Range Select Switch**. **Mid-Range** provides $\pm 15\text{dB}$ of continuously variable peaking equalization. The **Bass** and **Treble** controls provide $\pm 15\text{dB}$ of continuously variable shelving equalization at 100Hz and 10kHz respectively. Centering the three equalizer controls provides flat audio response by defeating all equalization.

F. High Pass (Low Cut) Filter Switch-actuated 12dB/octave high pass filter. The filter follows the equalizer, affecting the output to the cue, echo and program mixing buses. The switch has three positions: **OFF** bypasses the filter entirely; **40** attenuates audio below 40Hz; **80** attenuates audio below 80Hz, the most pronounced filter effect.

G. Input Level (Input Sensitivity) Switch A precision 4-stage switch that varies the preamplifier gain and/or attenuates the incoming signal. **Input Level** affects all outputs from the module. It provides optimum results with virtually any input, from -60dB to $+4\text{dB}$. When correctly adjusted, **Input Level** permits the input faders and echo mix controls to be used in their best range—with maximum headroom and minimum noise characteristics. The switch has 11 settings: -60 , -50 , -44 , -38 , -32 , -26 , -20 , -14 , -8 , -2 and $+4\text{dB}$, each corresponding to a nominal input level (i.e., -60dB is not a 60dB pad, but is the most sensitive characteristic for nominal -60dB inputs).

H. Channel Fader (Input Fader) A straightline control which provides continuously variable adjustment of the module's output to the program mixing buses, completely killing the signal at the bottom of its travel. The fader has no effect on the echo or cue outputs of the module.

I. Cue (Preview/Solo) Button Applies audio to an auxiliary cue mixing bus when the button is depressed. The cue bus is fed with pre-fader, post-equalizer audio. Since the cue feed is unaffected by the channel fader or the echo mix controls, the incoming signal may be previewed prior to assigning any audio to the program mixing or echo mixing buses. **Cue** is monitored via the headphone output.



MASTER AND MONITOR MODULE

A. Direct/Playback (Output Source Select) Switch

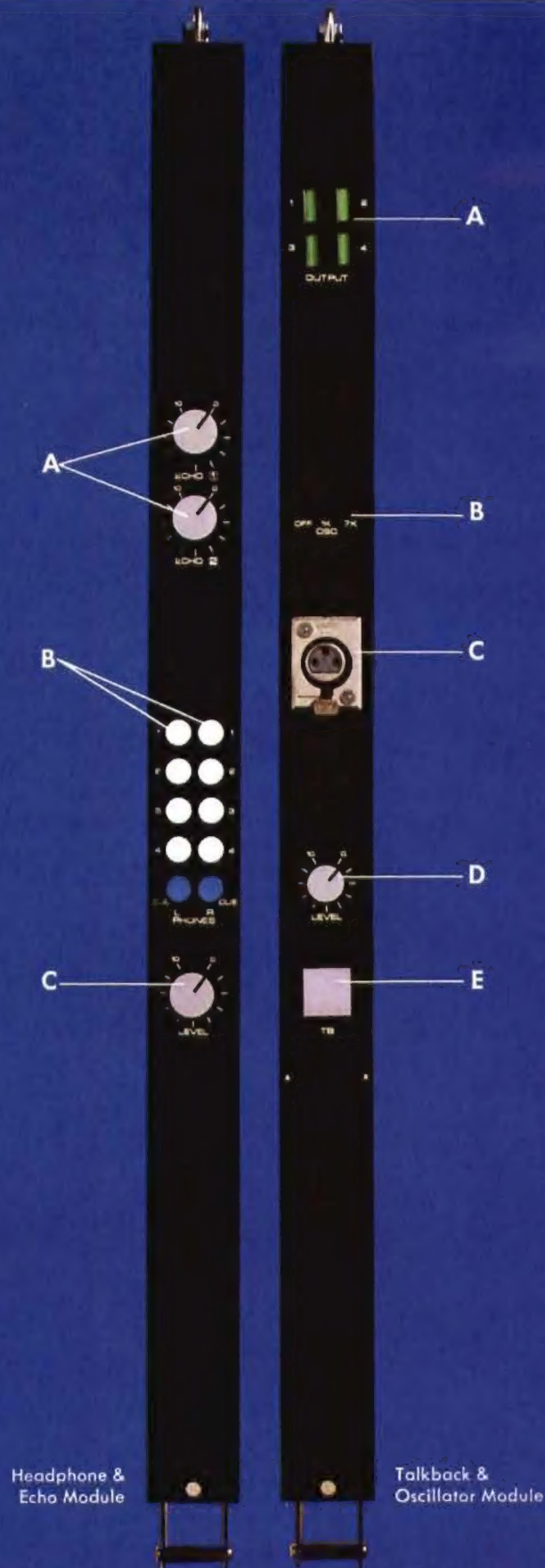
Selects the audio source applied to the master module's input. **Direct** mode derives audio from the program mixing bus numbered to correspond to the module (or from any source plugged into the Master In jack). **Playback (PB)** mode derives audio from the correspondingly numbered PB In jack. In practice, the **Direct/PB** switch selects between a live program and a recorded program to drive the console output.

B. Monitor Mix (Speaker Mix) Controls These rotary level controls, labeled **CH-1** through **CH-4**, derive audio from the line outputs of master modules 1-4. A monaural mixdown of the line outputs is obtained by adjusting the four monitor mix controls. This mono mix is brought to the **Monitor Out** jack, where it can drive a power amplifier for one or more loudspeakers. Since there are four master modules, each with an identical complement of four monitor mix controls, up to four distinct speaker mixes can be derived from the original four line outputs. This is known as a **4x4** matrix with level controls.

C. Monitor Master (Speaker Level) Control

Provides overall level control for the mono mix created with the monitor mix controls immediately above it. When the four monitor outputs are driving different loudspeakers, the **Monitor Masters** adjust the balance between speaker feeds. This **4x4** matrix arrangement offers far more flexibility for speaker feeding than would be available if the speakers were driven directly from the four line outputs (**Line A** or **Line B**).

D. Master Fader (Group Master) Sets the overall signal level applied to the main program outputs of the console, **Line A** and **Line B**. (**Line A** & **B** are identical, redundant outputs, each consisting of four connectors that derive audio from the **Direct/PB** switches.) The **Master** fader governs the correspondingly numbered line outputs, whether derived from the program mixing bus (in **Direct** mode) or the **Playback** input (in **PB** mode). Together, the four faders are useful for balancing the levels of different groups of inputs that have been assigned to the four mixing buses; in this capacity, the faders are **Group Master** controls.



HEADPHONE AND ECHO MODULE

A. Echo Send (Foldback) Master Controls Provide overall level control for echo mixing buses 1 and 2. The audio mixes established with the echo mix controls in each input module pass through the **Echo Send Masters**, and drive the **Echo Out** jacks. When the echo outputs are connected to fold-back (stage monitor) or performers' headphone systems, these master controls determine the monitor volume. When the echo outputs are connected to an echo or reverb device, the **Master** controls determine the level of the delay effect.

B. Headphone Mix Pushbuttons This portion of the module consists of two rows of pushbuttons, each row capable of selecting any combination of five audio sources. The left and right rows feed audio to the left and right sides of the headphone output. The five available sources are: program mix bus 1 through program mix bus 4, and the cue bus. When more than one pushbutton per row is latched, the selected audio sources are blended in equal proportions.

C. Headphone Level Control Simultaneously adjusts the overall volume of the left and right headphone feeds. This stereo output is available at two stereo phone jacks. The jacks are wired in parallel so as to drive one or two pairs of stereo headphones.

TALKBACK AND OSCILLATOR MODULE

A. Output Assign Switches When latched, switches 1 through 4 apply the module's output to program mixing buses 1 through 4. Depending on the status of the talkback button, the output will be either a vocal signal from the talkback mic input, or a test tone from the built-in oscillator.

B. Oscillator Function Switch Turns the oscillator **OFF**, or sets it for constant sine wave generation at 1,000 Hz or at 7,000 Hz.

C. Talkback Microphone Connector Accepts any low impedance microphone for use with the talkback circuitry.

D. Talkback Level Control Adjusts the talkback microphone preamplifier gain. This control affects only the talkback level, not the oscillator.

E. Talkback Button Pressing this button activates the talkback mic. If the oscillator is already switched on, pressing **Talkback** interrupts the oscillator and substitutes audio from the talkback preamplifier.

CONSOLE OPERATION

The technical manual that you will receive with your Yamaha PM-1000 is clearly written, fully detailed, and illustrated to provide you with an important useful operational tool in putting your mixer to optimum use.

Read and follow your manual carefully. The following excerpt is a good example of what it contains:

MASTER AND MONITOR MODULE

This module performs two distinctly separate functions. The linear Master Fader provides overall level control for the correspondingly numbered program mixing bus. The monitor portion of the module creates a monaural mixdown that is derived from the four Line A outputs (the program mixing buses). This mono mix is used to drive one of the house reinforcement amplifiers, a control room monitor amplifier, or (rarely) one channel of a tape machine.

Master Fader—The nominal fader setting, No. 7, produces the best combination of wide headroom and fine level control. For best results, when the initial program mix is set up, the master faders should be left at No. 7. Then, as the program mix is fully developed, or as channels are added and subtracted from the mix, the overall level of the four program buses can be trimmed with the master faders. If a master fader must be set above No. 9 or below No. 5, the overall level on that program bus may be too high or too low; all input faders assigned to the bus may be brought up or down to correct the condition, thereby obtaining optimum results.

At the conclusion of a scene, a tune, or any segment of the program, overall fades are most easily performed by bringing down the master faders. This is much easier than bringing down all the input faders, and it does not disturb an established program mix. (It will be necessary to fade the echo send masters in order to kill the stage monitors; this fade may be done after the master fade to achieve an unusual effect.)

Monitor Mix and Monitor Master Controls—The four monitor controls on each master module (labeled CH-1 through CH-4) derive a monaural blend from the console's master faders. Since the mix controls are duplicated in four adjacent modules, a 4 x 4 matrix is formed (not including the monitor master controls). Each vertical row of controls sets the mix and output level for one speaker feed (monitor output). Each horizontal row represents one program bus. The 4 x 4

matrix is an important new concept that allows far greater control of the sound than might be obtained by driving speaker amps directly from the bus outputs. Yamaha is the only console manufacturer to offer the matrix as standard equipment.

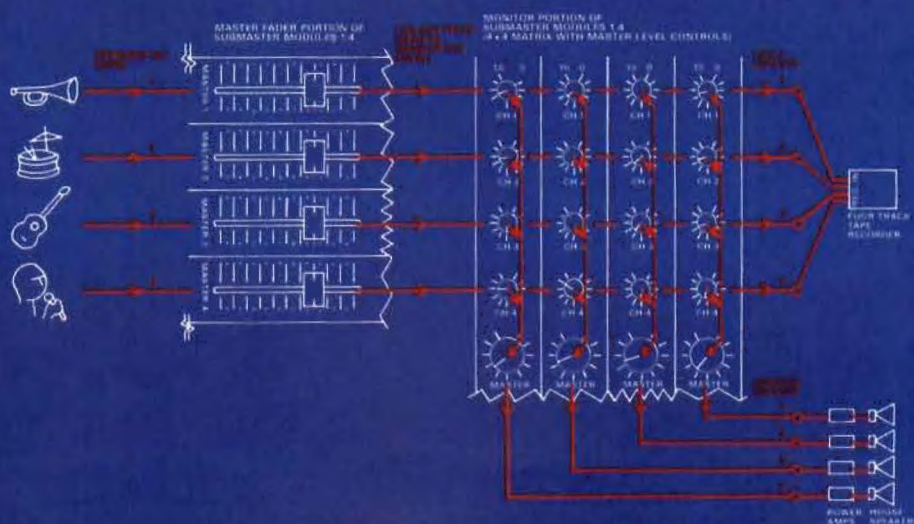
During a performance, stage monitor speakers and on-stage electric instrument amplifiers fill the near-stage audience with considerable amounts of instrumental sound. Therefore, reinforcement loudspeakers aimed at this portion of the audience require less instrumental and more vocal than those loudspeakers covering the middle and rear portions of the audience. The 4 x 4 matrix simplifies the job of obtaining this location-dependent speaker feed.

To take full advantage of the matrix, the four program mixing buses should be organized as group buses; vocal, rhythm, percussion, and lead instrument parts can be assigned to respective buses. The master faders then function as group masters. Within each master/monitor module, the mix controls set the balance between groups, and the monitor master control sets the overall mix level. In this way, each monitor output (speaker feed) can carry a distinctive blend of the four groups.

In practice, the 4 x 4 matrix is easy to use. For example, assume program bus No. 4 is the vocal group and there is too much vocal in the mix throughout the audience; pulling down master fader No. 4 simultaneously reduces the vocal content in all four speaker outputs. On the other hand, suppose that only the near-stage speakers contain too much vocal; the CH-4 monitor mix controls in the modules driving these speakers can be trimmed without affecting the vocal balance in the rear of the audience. As an added illustration of the matrix flexibility, assume the vocal balance which has just been corrected in the near-stage speakers has left those speakers with inadequate overall level; bringing up the monitor master controls for the same modules will increase the volume in the speakers without changing the balance of the vocal and instrumental groups—and without affecting the rear of the audience at all.

At the conclusion of a segment of the program, the house speakers may be faded in one of two ways: The master faders can be brought down or the monitor masters can be brought down. If the console's line output is driving a tape recording, the house speaker volume should be brought down with the monitor masters so that the recording continues at full level.

BLOCK DIAGRAM OF 4x4 MONITOR MATRIX AS USED TO ACHIEVE INDEPENDENT SPEAKER FEEDS



GENERAL SPECIFICATIONS

Frequency Response. +0, -4dB, 20Hz-20kHz; ± 0.5 dB, 50Hz-15kHz.

Total Harmonic Distortion. Less than 0.25% @ +10dB, 20Hz-20kHz; less than 0.5% @ +20dB, 70Hz-15kHz.

Hum and Noise* (20Hz-20kHz). -124dBm Equivalent Input Noise (E.I.N.). -69dB (73dB S/N) Line Out A & B: Master Fader at nominal level and all Input Faders down. -60dB (64dB S/N) Line Out A & B: Master Fader and one Input Fader at nominal level. -63dB (67dB S/N) Echo Out: Master Send at nominal level and all Echo Mix Controls down. -54dB (58dB S/N) Echo Out: Master Send and one Echo Mix Control at nominal level.

Maximum Voltage Gain (Input Selectors at -60dB, where applicable). PROGRAM -74 \pm 2dB from Channel In to Line Out A & B. 48 \pm 2dB from Channel In to Master Out. MONITOR -74 \pm 2dB from Channel In to Monitor Out. ECHO -74 \pm 2dB from Channel In to Echo Out. SUB IN -30 \pm 2dB from Sub In to Line Out A & B. PB IN -30 \pm 2dB from PB In to Line Out A & B. MASTER -32 \pm 2dB from Master In to Line Out A & B.

Equalization. BASS - ± 15 dB @ 100Hz, shelving. MID-RANGE - ± 15 dB @ 1kHz, 2kHz or 4kHz; peaking. TREBLE - ± 15 dB @ 10kHz, shelving.

High Pass Filter. 12dB per octave roll-off below 40Hz or 80Hz.

Oscillator. 1kHz or 7kHz sine wave, +4dBm @ <0.5% THD.

Talkback. Microphone input jack, preamp, level control, and push-to-talk switch; to pgm. buses and/or direct out.

*Measured with 6dB/octave filter @ 12.47kHz: Equivalent to a 20kHz filter with infinite dB/octave attenuation.

Inputs to Console. 16 x Channel Inputs (microphone and line sources). 4 x Sub In (Submixer input). 4 x Master In (Hi-Fi auxiliary program input). 4 x PB In (Playback input). 1 x Talkback Mic In.

Mixing Buses. 4 x Main Program (Line Out). 4 x Monitor (Speaker feed). 2 x Echo (Foldback/stage monitor). 1 x Cue (Preview).

Console Outputs. 8 x Line (4 Line A, 4 Line B). 4 x Monitor (Speaker feed). 4 x Master (Hi-Fi auxiliary program output). 2 x Echo (Foldback/stage monitor). 1 x Talkback (Talkback mic or oscillator out). 2 x Stereo Headphone (Console operator's monitor).

Crosstalk. -60dB at 1,000Hz, adjacent inputs, -50dB at 1,000 Hz, input to output.

VU Meters (0 VU = +4dBm). 4 x large, illuminated meters; switchable for Master (Line Out) or Monitor (Monitor Out). 2 x small, illuminated meters; Echo (Foldback) Out.

Phantom Power. 48Vdc applied to balanced channel input transformers for powering condenser microphones. May be turned On or Off with rear-panel switch.

Power Supply. Self-contained module inside console, fused and fully regulated. Requires 110-120 VAC, 50-60Hz, 45 Watts.

Finish. Black anodized aluminum panels, padded armrest, rosewood veneer cabinet.

Dimensions. 34 $\frac{1}{4}$ " (87.2cm) wide \times 34 $\frac{1}{2}$ " (87.5cm) deep \times 11" (27.7cm) high.

Weight. 110 pounds (50kg).

Accessories. Integral carrying handles and removable leatherette cover are included with console.

Warranty. One year, parts and labor.

INPUT & OUTPUT CHARACTERISTICS

INPUT SPECIFICATIONS

Connection	IMPEDANCE		SENSITIVITY* (At Max. Gain)	INPUT LEVEL		Connector In Console
	Actual	Nominal Source		Nominal*	Max. before Clip.	
Inputs (1-16)	1700 Ω , balanced	150 Ω Mics & 600 Ω Lines	0.25mV (-70dB)	0.8mV (-60dB)	12.3V (+24dB)	XLR-3-31
PB & Sub In (1-4)	2300 Ω , floating	600 Ω Lines & Instruments	40mV (-26dB)	80mV (-20dB)	3.2V (+12dB)	XLR-3-31
Master In (1-4)	9000 Ω , unbal.	5k Ω Lines & Instruments	31mV (-28dB)	62mV (-22dB)	12.3V (+24dB)	Phone Jack
Talkback Mic	2300 Ω , floating	150 Ω Mics	8mV (-40dB)	2.5mV (-50dB)	1.23V (+4dB)	XLR-3-31

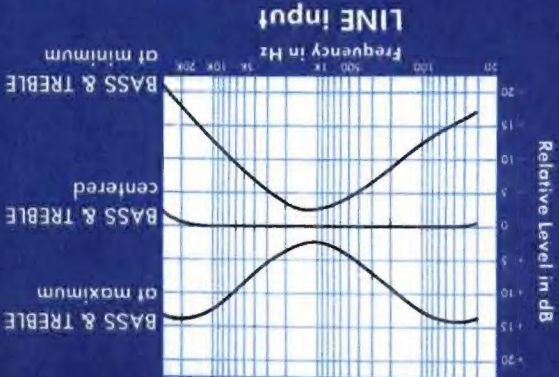
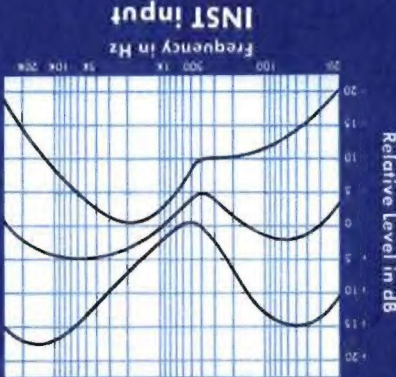
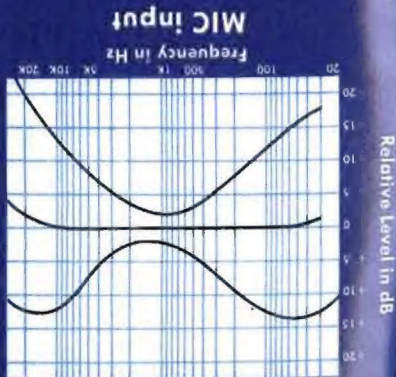
OUTPUT SPECIFICATIONS

Connection	IMPEDANCE		POWER OUTPUT LEVEL		Connector In Console
	Actual	Nominal Load	Nominal	Max. before Clipping	
Line A (1-4) Line B (1-4) Monitor (1-4) Echo 1 & 2 Talkback	100 Ω , floating	600 Ω	1.23V (+4dBm)	10.8V (+22 $\frac{1}{2}$ dBm)	XLR-3-32
Master Out (1-4)	200 Ω , unbal.	5,000 Ω	62mV (-22dB)	2.1V (+9dB)	Phone Jack
Headphones	3.2 Ω , unbal.	8 Ω or greater	80mV (-20dB)	1.23V (+4dB)	Stereo Phone Jack (x 2)

*This is the level required to produce an output of +4dBm (1.23V).

FREQUENCY RESPONSE CURVES

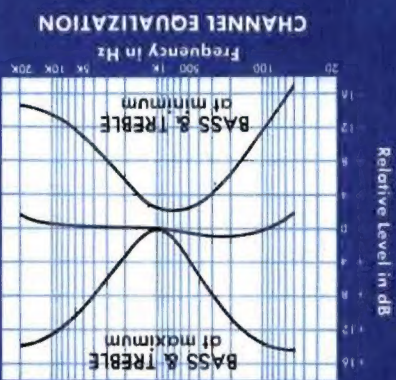
MIC, INST, and LINE inputs common to models EM-80, EM-100 and EM-150.



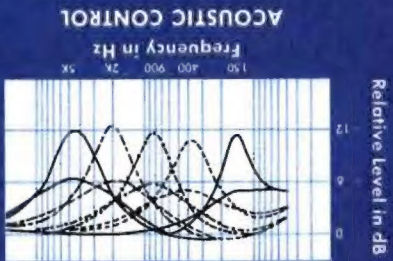
MODEL EM-150



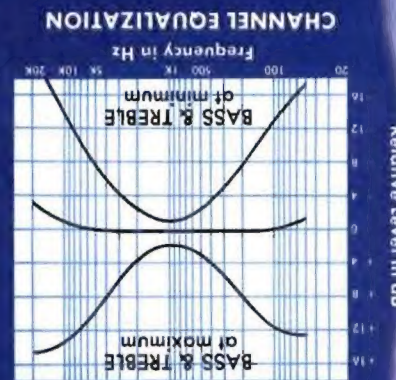
MODEL PM-200B



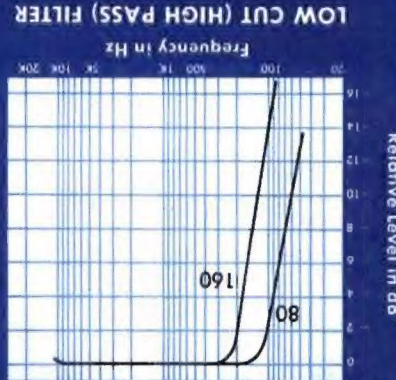
MODEL PM-200B



MODEL PM-400B



MODEL PM-400B



MODEL PM-1000

